

PATENT ABSTRACTS OF JAPAN

(11)Publication number : 2000-189387

(43)Date of publication of application : 11.07.2000

(51)Int.Cl. A61B 3/14
G02B 7/02
G03B 15/00
G03B 17/48

(21)Application number : 10-371799

(71)Applicant : TOPCON CORP

(22)Date of filing : 28.12.1998

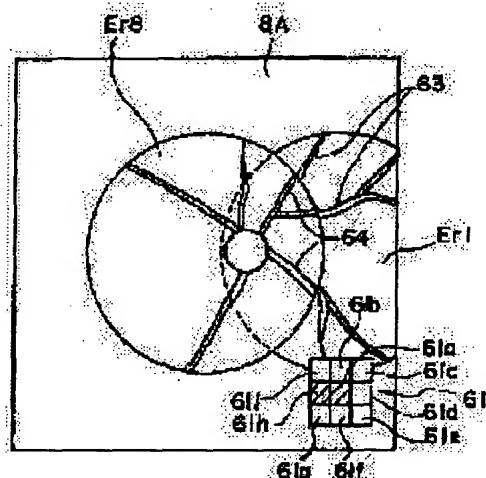
(72)Inventor : OKASHITA TOSHIHIRO
KATO TAKEYUKI

(54) OPHTHALMIC IMAGING DEVICE

(57)Abstract:

PROBLEM TO BE SOLVED: To produce panoramic images of regions to be imaged by photographing these regions with an observed one yet to be imaged interrelated intuitively with another or others having been imaged.

SOLUTION: The ophthalmic imaging device observes, as observation regions, partial regions to be imaged Er1 to Er8, by way of example, out of the whole region of an eye to be examined, and photographs the imaging regions Er1 to Er8, before displaying on a screen 8A a panoramic image consisting of interrelated still pictures obtained from the imaging. A display control means is provided to produce a movie display of the observation regions related to the still pictures on the screen 8A.



LEGAL STATUS

[Date of request for examination]

[Date of sending the examiner's decision of rejection]

[Kind of final disposal of application other than the examiner's decision of rejection or application converted registration]

[Date of final disposal for application]

[Patent number]

[Date of registration]

[Number of appeal against examiner's decision of rejection]

[Date of requesting appeal against examiner's decision of rejection]

[Date of extinction of right]

Copyright (C); 1998,2000 Japan se Patent Office

(19)日本国特許庁(JP)

(12)公開特許公報 (A)

(11)特許出願公開番号

特開2000-189387

(P2000-189387A)

(43)公開日 平成12年7月11日(2000.7.11)

(51)Int. Cl.⁷

識別記号

F I

テ-マ-ト*(参考)

A 6 1 B 3/14

A 6 1 B 3/14

A 2H104

J

Z

G 0 2 B 7/02

G 0 2 B 7/02

J

G 0 3 B 15/00

G 0 3 B 15/00

T

審査請求 未請求 請求項の数5

O L

(全9頁) 最終頁に続く

(21)出願番号 特願平10-371799

(22)出願日 平成10年12月28日(1998.12.28)

(71)出願人 000220343

株式会社トプコン

東京都板橋区蓮沼町75番1号

(72)発明者 岡下 敏宏

東京都板橋区蓮沼町75番1号株式会社トプ
コン内

(72)発明者 加藤 健行

東京都板橋区蓮沼町75番1号株式会社トプ
コン内

(74)代理人 100082670

弁理士 西脇 民雄

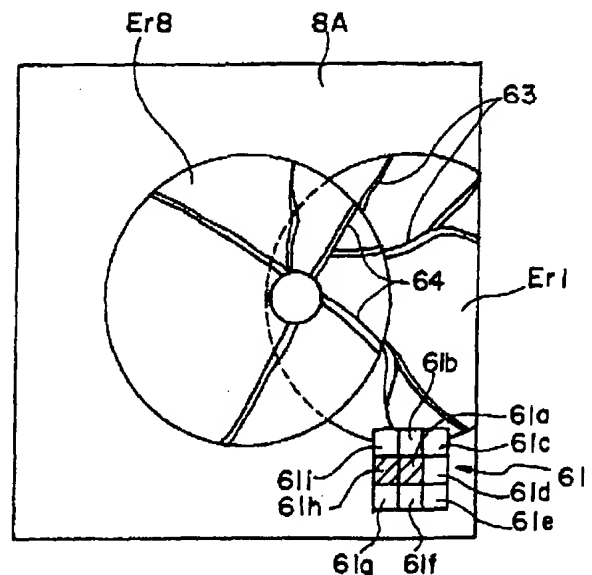
Fターム(参考) 2H104 AA12

(54)【発明の名称】眼科撮影装置

(57)【要約】

【課題】 これから撮影しようとする撮影すべき部位を
観察しているときに、すでに撮影が終わっている撮影部
位との相互関係を直感的に把握しつつ撮影を行ってパノ
ラマ画像を得ることのできる眼科撮影装置を提供する。

【解決手段】 この発明の眼科撮影装置は、被検眼の全
体に対する部分としての撮影すべき部位E r 1 ~ E r 9
を観察部位として観察した後、撮影すべき部位E r 1 ~
E r 9を撮影してこの撮影により得られた静止画E r
1' ~ E r 9' を相互に関連づけてパノラマ画像として
画面8 Aに表示し、画面8 Aに静止画E r 1' ~ E r
9' と関連づけて観察部位が動画で表示されるように制
御する表示制御手段が設けられている。



【特許請求の範囲】

【請求項1】 被検眼の全体に対する部分としての撮影すべき部位を観察部位として観察した後、前記撮影すべき部位を撮影してこの撮影により得られた静止画を相互に関連づけてパノラマ画像として画面に表示する眼科撮影装置であって、

前記画面に前記静止画と関連づけて前記観察部位が動画で表示されるように制御する表示制御手段が設けられていることを特徴とする眼科撮影装置。

【請求項2】 前記表示制御手段は前記観察部位が前記画面上の中央部分に表示されかつ前記観察部位に関連づけられる静止画が前記画面上の周辺部に表示されるように制御することを特徴とする請求項1に記載の眼科撮影装置。

【請求項3】 前記被検眼のディオブターに基づいて前記画面上での表示倍率を補正する表示倍率補正手段が設けられている請求項1に記載の眼科撮影装置。

【請求項4】 前記撮影すべき部位が眼底部位であることを特徴とする請求項3に記載の眼科撮影装置。

【請求項5】 被検眼の全体に対する部分としての撮影すべき部位を観察部位として観察した後、前記撮影すべき部位を撮影してこの撮影により得られた静止画を相互に関連づけてパノラマ画像として画面に表示する眼科撮影装置であって、前記画面に互いに関連づけて表示された各静止画のいずれかを画面上で指定する指定手段と、該指定手段により指定された静止画の画面上での輝度を調整する輝度調整手段とを備えている眼科撮影装置。

【発明の詳細な説明】

【0001】

【発明の属する技術分野】本発明は、被検眼の眼底、角膜内皮、角膜断面等の撮影部位を撮影する眼科撮影装置の改良に関する。

【0002】

【従来の技術】従来から、被検眼の眼底、角膜内皮、角膜断面等の撮影部位を撮影する眼科撮影装置が知られている。この種の眼科撮影装置、例えば、眼底を撮影する眼底カメラでは、眼底の全体に対する部分としての撮影すべき各部位を観察部位（アライメント画像）としてモニタの画面上に動画で表示し、この画面上に表示された各観察部位を観察しつつそれぞれ撮影して、この撮影により得られた撮影すべき各部位を静止画としてスチルビデオレコーダー等に記録し、この撮影により得られた各静止画を相互に関連づけてパノラマ画像として画面に表示するようにしている。

【0003】

【発明が解決しようとする課題】しかしながら、この種の眼科撮影装置では、各眼底部位を関連づけてモニタの画面上に静止画として表示するものとしたとき、得られた各静止画を関連づけて貼り合わせて合成する作業が煩わしく、各静止画を間違えて関連づけるおそれもあり、

被検眼の全体を広い範囲で検査する場合に問題になっている。

【0004】そこで、特開平9-173298号公報に開示のものでは、被検眼の撮影すべき部位を選択する位置選択手段を設け、撮影すべき部位を撮影により静止画として記録手段に記録すると共に位置選択手段により選択された撮影位置を記録手段に記録し、画像制御手段が撮影位置に基づいて各静止画を関連づけて画面に表示させるようにしている。

【0005】このものによれば、得られた各静止画を関連づけて貼り合わせて合成する作業に煩わされることなく、また、各静止画を間違えて関連づけるおそれもない。

【0006】ところが、この特開平9-173298号公報に開示のものでは、被検眼を観察しているときには、すでに撮影の終わっている撮影部位が画面上に表示されず、画面上にはこれから撮影しようとする撮影すべき部位が動画で表示されるのみであるので、これから撮影しようとする撮影すべき部位を観察しているときにすでに撮影が終わっている撮影部位との相互関係を直感的に把握しにくいという問題がある。

【0007】本発明は、上記の事情に鑑みて為されたもので、その目的とするところは、これから撮影しようとする撮影すべき部位を観察しているときに、すでに撮影が終わっている撮影部位との相互関係を直感的に把握しつつ撮影を行ってパノラマ画像を得ることのできる眼科撮影装置を提供することにある。

【0008】

【課題を解決するための手段】本発明の請求項1に記載の眼科撮影装置は、被検眼の全体に対する部分としての撮影すべき部位を観察部位として観察した後、前記撮影すべき部位を撮影してこの撮影により得られた静止画を相互に関連づけてパノラマ画像として画面に表示する眼科撮影装置であって、前記画面に前記静止画と関連づけて前記観察部位が動画で表示されるように制御する表示制御手段が設けられていることを特徴とする。

【0009】本発明の請求項2に記載の眼科撮影装置は、前記表示制御手段は前記観察部位が前記画面上の中央部分に表示されかつ前記観察部位に関連づけられる静止画が前記画面上の周辺部に表示されるように制御することを特徴とする。

【0010】本発明の請求項3に記載の眼科撮影装置は、前記被検眼のディオブターに基づいて前記画面上での表示倍率を補正する表示倍率補正手段が設けられていることを特徴とする。

【0011】本発明の請求項4に記載の眼科撮影装置は、前記撮影すべき部位が眼底部位であることを特徴とする本発明の請求項5に記載の眼科撮影装置は、被検眼の全体に対する部分としての撮影すべき部位を観察部位として観察した後、前記撮影すべき部位を撮影してこの

撮影により得られた静止画を相互に関連づけてパノラマ画像として画面に表示する眼科撮影装置であって、前記画面に互いに関連づけて表示された各静止画のいずれかを画面上で指定する指定手段と、該指定手段により指定された静止画の画面上での輝度を調整する輝度調整手段とを備えていることを特徴とする。

【0012】

【発明の実施の形態】図1は本発明に係わる眼科撮影装置の一例としての無散瞳タイプの眼底カメラの外観図を示し、この図1において、1Aはベース、1Bは架台、1Cは装置本体、2は顎受け、3は顎当て、4は外部固視灯、5Aはジョイスティック、5Bは撮影スイッチ、6はTVカメラであり、これらの構成は公知である。

【0013】装置本体の内部には、図2に示すように被検眼Eの眼底Erを照明するための照明光学系10と眼底Erを撮影する撮影光学系20と、観察光学系20'と、眼底Erに固視標を投影して被検眼を固視させるための内部固視標投影光学系50と、被検眼に対する装置本体の位置合わせを行うためのアライメント光学系（図示を略す）とを備えている。

【0014】照明光学系10は対物レンズ11と、孔空きミラー12と、リレーレンズ13と、反射ミラー14と、リレーレンズ15と、被検眼Eの瞳孔Eaと共役関係に保たれたリング開口16Aを有するリング開口板16と、コンデンサレンズ17と、照明光源18とを有している。

【0015】照明光学系10は観察時には赤外光により眼底を照明し、撮影時には可視光により眼底を照明するもので、その構成は公知であるのでその詳細な説明は省略する。

【0016】撮影光学系20は、対物レンズ11と、合焦レンズ21と、結像レンズ22と、反射ミラー23を有し、TVカメラ6は撮像素子6aを有する。TVカメラ6はフィールドレンズ24と、反射ミラー25と、リレーレンズ26とからなるリレーレンズ系25Aを介して撮影光学系20に光学的に接続されている。その撮像素子6aは眼底Erと光学的に共役関係に維持される。

【0017】観察光学系20'はダイクロイックミラー23'、反射ミラー25'、リレーレンズ26'、TVカメラ6'を有する。ダイクロイックミラー23'は赤外光を反射し、可視光を透過する特性を有する。

【0018】TVカメラ6は画像記録器機器としてのステルビデオレコーダー7に接続され、このステルビデオレコーダー7はモニター8に接続されている。そのモニター8には、その画面8Aに被検眼の眼底を撮影するとき眼底の全体に対する部分としての撮影すべき部位が観察部位として動画で表示される。

【0019】検査者はその観察部位を観察しつつアライメントを行って撮影を行う。その撮影すべき部位は静止画

チルビデオレコーダー7に記録された静止画は画面8Aに表示されるようになっている。そのモニター8、ステルビデオレコーダー7は制御装置9によって制御され、その制御の詳細は後述する。

【0020】内部固視標投影光学系50は、図3に示すように、中心に配置された発光ダイオード51a及びこの発光ダイオード51aの周囲に等間隔に正形状に配置された8個の発光ダイオード51b～51iと、図4に示すように各発光ダイオード51a～51iに対向して設けられたピンホール52a～52iを有するマスク板52と、ハーフミラー53と、結像レンズ22と、合焦レンズ21と、対物レンズ11とからなる。

【0021】この発光ダイオード51a～51iの光はピンホール52a～52i、ハーフミラー53、結像レンズ22、合焦レンズ21、対物レンズ11を介して眼底Erに固視標として投影され、眼底Erにピンホール像が結像され、被検者はこの固視標を視認することにより固視が固定され、このピンホール52a～52iのいずれを点灯させるかによって、撮影光学系20の光軸Oに対する被検者の固視の方向が切り換えられ、これにより眼底Erの撮影すべき部位が変更されるものである。ここでは、眼底Erの撮影すべき部位は図5に示すように9個とした。

【0022】発光ダイオード51aを点灯させると、中央の撮影すべき部位Er1が撮影され、発光ダイオード51bを点灯させると、真上の撮影すべき部位Er2が撮影され、発光ダイオード51cを点灯させると、右斜め上の撮影すべき部位Er3が撮影され、発光ダイオード51dを点灯させると、右横の撮影すべき部位Er4が撮影され、発光ダイオード51eを点灯させると、右斜め下の撮影すべき部位Er5が撮影され、発光ダイオード51fを点灯させると、真下の撮影すべき部位Er6が撮影され、発光ダイオード51gを点灯させると、左斜め下の撮影すべき部位Er7が撮影され、発光ダイオード51hを点灯させると、左横の撮影すべき部位Er8が撮影され、発光ダイオード51iを点灯させると、左斜め上の撮影すべき部位Er9が撮影されるようになっている。

【0023】モニター8の画面8Aには、図6に示すように、撮影の前には、眼底Erの全体に対する部分としての撮影すべき部位がアライメント画像として表示される。このアライメント画像は動画である。この図6では、被検眼が発光ダイオード51aを固視しているものとして、画面8Aにはその略中央部に撮影すべき部位Er1が動画で表示されている。

【0024】制御装置9はマウス等の操作手段60を有し、画面8Aには操作手段60を操作することにより、アライメント画像、静止画像と共に、眼底Erの全体に対する撮影すべき部位の位置を認識させる認識パターンが表示される。眼底部位Er1～Er9については

未撮影であるので、図6においては、撮影すべき部位Er1のみが表示され、後述する静止画は表示されていない。

【0025】認識パターン61は、ここでは、9個の升目61a~61iから構成され、この9個の升目61aないし61iは撮影部位Er1~Er9にそれぞれ対応する位置関係をもって配置されている。この認識パターン61は、例えば撮影すべき部位の撮影が実行されると、その撮影すべき部位に対応する升目の輝度が高くなるようにされ、全く撮影の行われていない状態では、各升目61a~61iの輝度は低輝度であり、例えば、中央の部位Er1のアライメント画像が表示されている状態で撮影スイッチ5Bを操作することにより撮影を実行すると、升目61aが低輝度から高輝度に変更され、これにより、眼底Erの全体に対する撮影すべき部位のいずれの位置の撮影すべき部位の撮影が行われたかが認識される。その撮影すべき部位Er1はスチルビデオレコーダー7に静止画Er1'として記録される。次に、発光ダイオード51hを点灯させて被検眼Eの固視を誘導すると、図7に示すように画面8Aに撮影すべき部位Er8に対応するアライメント画像が動画で表示される。撮影すべき部位Er8は画面8Aの略中央部に表示される。

【0026】操作手段60を操作して画面8A上で所望の静止画（ここでは、Er1'）の呼び出し指定をすると、静止画Er1'が表示されると共に認識パターン61が表示される。この操作手段60を操作して画面8A上で観察を指定すると、静止画Er1'はアライメント画像Erに対して相対位置関係を保って画面8A上の周辺部に移動され、画面8Aには静止画Er1'の一部が表示され、制御装置9と操作手段60とは、画面8A上に静止画と関連づけて観察部位が動画で表示されるように制御する表示制御手段として機能する。

【0027】これにより、これから撮影しようとする撮影すべき部位を観察しているときに、すでに撮影が終わっている撮影部位との相互関係を直感的に把握しつつ撮影を行ってパノラマ画像を得ることができる。また、観察部位を縮小することなく画面上に表示して静止画と観察部位とを関連づけることができる。

【0028】この状態で、撮影スイッチ5Bを操作することにより撮影を実行すると、升目61hが低輝度から高輝度に変更され、眼底撮影部位Er8の撮影部位が実行されたことが画面8Aに表示される。その図7において、撮影が実行されて高輝度になった升目61a、61hを斜線で示す。同時に、眼底撮影部位Er8がスチルビデオレコーダー7に記録される。制御装置9は各撮影部位Er1~Er9をスチルビデオレコーダー7に記録する際に、各撮影部位Er1~Er9と共に撮影部位情報を記録させる。ここでは、撮影部位情報として同一符号Er1~Er9が用いられる

【0029】ところで、この眼科撮影装置では、被検眼のディオプターを0度（正常）とみなして、各撮影すべき部位Er1~Er9の相対位置関係を計算して画面8Aに表示するようにしている。しかしながら、被検眼のディオプターが0度でないとき、すなわち、近視、遠視の被検眼の場合、撮影倍率が異なるため、図8に示すように、撮影済みの静止画とこれに隣接する動画とを精度良くつなげることができないという問題点がある。

【0030】被検眼のディオプターと撮影倍率との間には、一定の関係があるので、図1に示す合焦ハンドル21Aを用いて図2に示す合焦レンズ21を光軸方向に移動させて合焦を行ったときのディオプター値に基づいて、画面8A上での表示倍率を制御装置9により補正するようにすると、図9に示すように撮影済みの静止画とこれに隣接する動画とを精度良くつなげることができる。合焦ハンドル21Aの周囲には、図10に示すように、正視眼位置の基準マーク21B、+a（ディオプタ）、-a（ディオプタ）の目盛21Cが設けられ、合焦ハンドル21Aを操作することにより合焦レンズ21が移動され、合焦した時点で合焦ボタン21Dを押すと、被検眼のディオプターが制御装置9に記憶され、これにより表示倍率の変更が行われる。このとき、制御装置9は被検眼のディオプター値に基づいて表示倍率を補正する表示倍率補正手段として機能する。

【0031】各撮影すべき部位Er1~Er9を撮影し終わって操作手段60を操作すると、画面8Aには図11に示すように静止画Er1'~Er9'により眼底像が全体像（パノラマ画像）として表示される。ここで、各静止画Er1'~Er9'の輝度を見比べてみて、非常に輝度の高い静止画、あるいは、低い静止画があったとする。

【0032】その場合には、その輝度の高い静止画、あるいは、低い静止画をマウス等の操作手段60によりカーソルを移動させてカーソルの位置する画像上でクリックして指定する。すると、その指定された静止画が画面8Aの表面に現れると同時に、画面8Aに輝度調整仮想スライドツマミ62が表示される。

【0033】操作手段60により輝度調整仮想スライドツマミ62を画面上で操作して隣り合う静止画の輝度と違和感のない輝度とすることができ、違和感無く各静止画を連続的につなげて全体の被検眼像を合成できる。

【0034】また、図12に各静止画Er1'~Er9'を並列的に表示し、各静止画Er1'~Er9'の明るさを見比べて、各静止画Er1'~Er9'毎に輝度調整指定を行い、各静止画毎の輝度調整を行っても良い。

【0035】この発明の実施の形態では、固視標としての発光ダイオード51b~51iを発光ダイオード51aを中心にして正方形の配列としたので、図11に示すように眼底像の静止画（眼底像）の重なり部分を

少なくすることができるという長所があるが、図13

(a)に示すように発光ダイオード51b~51iを発光ダイオード51aを中心に円周上に配列すると共に、図13(b)に示すようにマスク板52のピンホール52a~52iを発光ダイオード51a~51iに対応させて配列し、図14に示すように静止画Er1'~Er9'を画面8A上に表示するようにしても良い。

【0036】ここでは、眼底中央を中心に80度の範囲内の眼底像が撮影できるようにされているが、100度、120度の範囲内の眼底像を撮影できるようにして

10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78 79 80 81 82 83 84 85 86 87 88 89 90 91 92 93 94 95 96 97 98 99 100 101 102 103 104 105 106 107 108 109 110 111 112 113 114 115 116 117 118 119 120 121 122 123 124 125 126 127 128 129 130 131 132 133 134 135 136 137 138 139 140 141 142 143 144 145 146 147 148 149 150 151 152 153 154 155 156 157 158 159 160 161 162 163 164 165 166 167 168 169 170 171 172 173 174 175 176 177 178 179 180 181 182 183 184 185 186 187 188 189 190 191 192 193 194 195 196 197 198 199 200 201 202 203 204 205 206 207 208 209 210 211 212 213 214 215 216 217 218 219 220 221 222 223 224 225 226 227 228 229 230 231 232 233 234 235 236 237 238 239 240 241 242 243 244 245 246 247 248 249 250 251 252 253 254 255 256 257 258 259 260 261 262 263 264 265 266 267 268 269 270 271 272 273 274 275 276 277 278 279 280 281 282 283 284 285 286 287 288 289 290 291 292 293 294 295 296 297 298 299 300 301 302 303 304 305 306 307 308 309 310 311 312 313 314 315 316 317 318 319 320 321 322 323 324 325 326 327 328 329 330 331 332 333 334 335 336 337 338 339 340 341 342 343 344 345 346 347 348 349 350 351 352 353 354 355 356 357 358 359 360 361 362 363 364 365 366 367 368 369 370 371 372 373 374 375 376 377 378 379 380 381 382 383 384 385 386 387 388 389 390 391 392 393 394 395 396 397 398 399 400 401 402 403 404 405 406 407 408 409 410 411 412 413 414 415 416 417 418 419 420 421 422 423 424 425 426 427 428 429 430 431 432 433 434 435 436 437 438 439 440 441 442 443 444 445 446 447 448 449 450 451 452 453 454 455 456 457 458 459 460 461 462 463 464 465 466 467 468 469 470 471 472 473 474 475 476 477 478 479 480 481 482 483 484 485 486 487 488 489 490 491 492 493 494 495 496 497 498 499 500 501 502 503 504 505 506 507 508 509 510 511 512 513 514 515 516 517 518 519 520 521 522 523 524 525 526 527 528 529 530 531 532 533 534 535 536 537 538 539 540 541 542 543 544 545 546 547 548 549 550 551 552 553 554 555 556 557 558 559 560 561 562 563 564 565 566 567 568 569 570 571 572 573 574 575 576 577 578 579 580 581 582 583 584 585 586 587 588 589 590 591 592 593 594 595 596 597 598 599 600 601 602 603 604 605 606 607 608 609 610 611 612 613 614 615 616 617 618 619 620 621 622 623 624 625 626 627 628 629 630 631 632 633 634 635 636 637 638 639 640 641 642 643 644 645 646 647 648 649 650 651 652 653 654 655 656 657 658 659 660 661 662 663 664 665 666 667 668 669 670 671 672 673 674 675 676 677 678 679 680 681 682 683 684 685 686 687 688 689 690 691 692 693 694 695 696 697 698 699 700 701 702 703 704 705 706 707 708 709 710 711 712 713 714 715 716 717 718 719 720 721 722 723 724 725 726 727 728 729 730 731 732 733 734 735 736 737 738 739 740 741 742 743 744 745 746 747 748 749 750 751 752 753 754 755 756 757 758 759 760 761 762 763 764 765 766 767 768 769 770 771 772 773 774 775 776 777 778 779 780 781 782 783 784 785 786 787 788 789 790 791 792 793 794 795 796 797 798 799 800 801 802 803 804 805 806 807 808 809 810 811 812 813 814 815 816 817 818 819 820 821 822 823 824 825 826 827 828 829 830 831 832 833 834 835 836 837 838 839 840 841 842 843 844 845 846 847 848 849 850 851 852 853 854 855 856 857 858 859 860 861 862 863 864 865 866 867 868 869 870 871 872 873 874 875 876 877 878 879 880 881 882 883 884 885 886 887 888 889 890 891 892 893 894 895 896 897 898 899 900 901 902 903 904 905 906 907 908 909 910 911 912 913 914 915 916 917 918 919 920 921 922 923 924 925 926 927 928 929 930 931 932 933 934 935 936 937 938 939 940 941 942 943 944 945 946 947 948 949 950 951 952 953 954 955 956 957 958 959 960 961 962 963 964 965 966 967 968 969 970 971 972 973 974 975 976 977 978 979 980 981 982 983 984 985 986 987 988 989 990 991 992 993 994 995 996 997 998 999 1000 1001 1002 1003 1004 1005 1006 1007 1008 1009 1010 1011 1012 1013 1014 1015 1016 1017 1018 1019 1020 1021 1022 1023 1024 1025 1026 1027 1028 1029 1030 1031 1032 1033 1034 1035 1036 1037 1038 1039 1040 1041 1042 1043 1044 1045 1046 1047 1048 1049 1050 1051 1052 1053 1054 1055 1056 1057 1058 1059 1060 1061 1062 1063 1064 1065 1066 1067 1068 1069 1070 1071 1072 1073 1074 1075 1076 1077 1078 1079 1080 1081 1082 1083 1084 1085 1086 1087 1088 1089 1090 1091 1092 1093 1094 1095 1096 1097 1098 1099 1100 1101 1102 1103 1104 1105 1106 1107 1108 1109 1110 1111 1112 1113 1114 1115 1116 1117 1118 1119 1120 1121 1122 1123 1124 1125 1126 1127 1128 1129 1130 1131 1132 1133 1134 1135 1136 1137 1138 1139 1140 1141 1142 1143 1144 1145 1146 1147 1148 1149 1150 1151 1152 1153 1154 1155 1156 1157 1158 1159 1160 1161 1162 1163 1164 1165 1166 1167 1168 1169 1170 1171 1172 1173 1174 1175 1176 1177 1178 1179 1180 1181 1182 1183 1184 1185 1186 1187 1188 1189 1190 1191 1192 1193 1194 1195 1196 1197 1198 1199 1200 1201 1202 1203 1204 1205 1206 1207 1208 1209 1210 1211 1212 1213 1214 1215 1216 1217 1218 1219 1220 1221 1222 1223 1224 1225 1226 1227 1228 1229 1230 1231 1232 1233 1234 1235 1236 1237 1238 1239 1240 1241 1242 1243 1244 1245 1246 1247 1248 1249 1250 1251 1252 1253 1254 1255 1256 1257 1258 1259 1260 1261 1262 1263 1264 1265 1266 1267 1268 1269 1270 1271 1272 1273 1274 1275 1276 1277 1278 1279 1280 1281 1282 1283 1284 1285 1286 1287 1288 1289 1290 1291 1292 1293 1294 1295 1296 1297 1298 1299 1300 1301 1302 1303 1304 1305 1306 1307 1308 1309 1310 1311 1312 1313 1314 1315 1316 1317 1318 1319 1320 1321 1322 1323 1324 1325 1326 1327 1328 1329 1330 1331 1332 1333 1334 1335 1336 1337 1338 1339 1340 1341 1342 1343 1344 1345 1346 1347 1348 1349 1350 1351 1352 1353 1354 1355 1356 1357 1358 1359 1360 1361 1362 1363 1364 1365 1366 1367 1368 1369 1370 1371 1372 1373 1374 1375 1376 1377 1378 1379 1380 1381 1382 1383 1384 1385 1386 1387 1388 1389 1390 1391 1392 1393 1394 1395 1396 1397 1398 1399 1400 1401 1402 1403 1404 1405 1406 1407 1408 1409 1410 1411 1412 1413 1414 1415 1416 1417 1418 1419 1420 1421 1422 1423 1424 1425 1426 1427 1428 1429 1430 1431 1432 1433 1434 1435 1436 1437 1438 1439 1440 1441 1442 1443 1444 1445 1446 1447 1448 1449 1450 1451 1452 1453 1454 1455 1456 1457 1458 1459 1460 1461 1462 1463 1464 1465 1466 1467 1468 1469 1470 1471 1472 1473 1474 1475 1476 1477 1478 1479 1480 1481 1482 1483 1484 1485 1486 1487 1488 1489 1490 1491 1492 1493 1494 1495 1496 1497 1498 1499 1500 1501 1502 1503 1504 1505 1506 1507 1508 1509 1510 1511 1512 1513 1514 1515 1516 1517 1518 1519 1520 1521 1522 1523 1524 1525 1526 1527 1528 1529 1530 1531 1532 1533 1534 1535 1536 1537 1538 1539 1540 1541 1542 1543 1544 1545 1546 1547 1548 1549 1550 1551 1552 1553 1554 1555 1556 1557 1558 1559 1560 1561 1562 1563 1564 1565 1566 1567 1568 1569 1570 1571 1572 1573 1574 1575 1576 1577 1578 1579 1580 1581 1582 1583 1584 1585 1586 1587 1588 1589 1590 1591 1592 1593 1594 1595 1596 1597 1598 1599 1600 1601 1602 1603 1604 1605 1606 1607 1608 1609 1610 1611 1612 1613 1614 1615 1616 1617 1618 1619 1620 1621 1622 1623 1624 1625 1626 1627 1628 1629 1630 1631 1632 1633 1634 1635 1636 1637 1638 1639 1640 1641 1642 1643 1644 1645 1646 1647 1648 1649 1650 1651 1652 1653 1654 1655 1656 1657 1658 1659 1660 1661 1662 1663 1664 1665 1666 1667 1668 1669 1670 1671 1672 1673 1674 1675 1676 1677 1678 1679 1680 1681 1682 1683 1684 1685 1686 1687 1688 1689 1690 1691 1692 1693 1694 1695 1696 1697 1698 1699 1700 1701 1702 1703 1704 1705 1706 1707 1708 1709 1710 1711 1712 1713 1714 1715 1716 1717 1718 1719 1720 1721 1722 1723 1724 1725 1726 1727 1728 1729 1730 1731 1732 1733 1734 1735 1736 1737 1738 1739 1740 1741 1742 1743 1744 1745 1746 1747 1748 1749 1750 1751 1752 1753 1754 1755 1756 1757 1758 1759 1760 1761 1762 1763 1764 1765 1766 1767 1768 1769 1770 1771 1772 1773 1774 1775 1776 1777 1778 1779 1780 1781 1782 1783 1784 1785 1786 1787 1788 1789 1790 1791 1792 1793 1794 1795 1796 1797 1798 1799 1800 1801 1802 1803 1804 1805 1806 1807 1808 1809 1810 1811 1812 1813 1814 1815 1816 1817 1818 1819 1820 1821 1822 1823 1824 1825 1826 1827 1828 1829 1830 1831 1832 1833 1834 1835 1836 1837 1838 1839 1840 1841 1842 1843 1844 1845 1846 1847 1848 1849 1850 1851 1852 1853 1854 1855 1856 1857 1858 1859 1860 1861 1862 1863 1864 1865 1866 1867 1868 1869 1870 1871 1872 1873 1874 1875 1876 1877 1878 1879 1880 1881 1882 1883 1884 1885 1886 1887 1888 1889 1890 1891 1892 1893 1894 1895 1896 1897 1898 1899 1900 1901 1902 1903 1904 1905 1906 1907 1908 1909 1910 1911 1912 1913 1914 1915 1916 1917 1918 1919 1920 1921 1922 1923 1924 1925 1926 1927 1928 1929 1930 1931 1932 1933 1934 1935 1936 1937 1938 1939 1940 1941 1942 1943 1944 1945 1946 1947 1948 1949 1950 1951 1952 1953 1954 1955 1956 1957 1958 1959 1960 1961 1962 1963 1964 1965 1966 1967 1968 1969 1970 1971 1972 1973 1974 1975 1976 1977 1978 1979 1980 1981 1982 1983 1984 1985 1986 1987 1988 1989 1990 1991 1992 1993 1994 1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018 2019 2020 2021 2022 2023 2024 2025 2026 2027 2028 2029 2030 2031 2032 2033 2034 2035 2036 2037 2038 2039 2040 2041 2042 2043 2044 2045 2046 2047 2048 2049 2050 2051 2052 2053 2054 2055 2056 2057 2058 2059 2060 2061 2062 2063 2064 2065 2066 2067 2068 2069 2070 2071 2072 2073 2074 2075 2076 2077 2078 2079 2080 2081 2082 2083 2084 2085 2086 2087 2088 2089 2090 2091 2092 2093 2094 2095 2096 2097 2098 2099 2100 2101 2102 2103 2104 2105 2106 2107 2108 2109 2110 2111 2112 2113 2114 2115 2116 2117 2118 2119 2120 2121 2122 2123 2124 2125 2126 2127 2128 2129 2130 2131 2132 2133 2134 2135 2136 2137 2138 2139 2140 2141 2142 2143 2144 2145 2146 2147 2148 2149 2150 2151 2152 2153 2154 2155 2156 2157 2158 2159 2160 2161 2162 2163 2164 2165 2166 2167 2168 2169 2170 2171 2172 2173 2174 2175 2176 2177 2178 2179 2180 2181 2182 2183 2184 2185 2186 2187 2188 2189 2190 2191 2192 2193 2194 2195 2196 2197 2198 2199 2200 2201 2202 2203 2204 2205 2206 2207 2208 2209 2210 2211 2212 2213 2214 2215 2216 2217 2218 2219 2220 2221 2222 2223 2224 2225 2226 2227 2228 2229 2230 2231 2232 2233 2234 2235 2236 2237 2238 2239 2240 2241 2242 2243 2244 2245 2246 2247 2248 2249 2250 2251 2252 2253 2254 2255 2256 2257 2258 2259 2260 2261 2262 2263 2264 2265 2266 2267 2268 2269 2270 2271 2272 2273 2274 2275 2276 2277 2278 2279 2280 2281 2282 2283 2284 2285 2286 2287 2288 2289 2290 2291 2292 2293 2294 2295 2296 2297 2298 2299 2300 2301 2302 2303 2304 2305 2306 2307 2308 2309 2310 2311 2312 2313 2314 2315 2316 2317 2318 2319 2320 2321 2322 2323 2324 2325 2326 2327 2328 2329 2330 2331 2332 2333 2334 2335 2336 2337 2338 2339 2340 2341 2342 2343 2344 2345 2346 2347 2348 2349 2350 2351 2352 2353 2354 2355 2356 2357 2358 2359 2360 2361 2362 2363 2364 2365 2366 2367 2368 2369 2370 2371 2372 2373 2374 2375 2376 2377 2378 2379 2380 2381 2382 2383 2384 2385 2386 2387 2388 2389 2390 2391 2392 2393 2394 2395 2396 2397 2398 2399 2400 2401 2402 2403 2404 2405 2406 2407 2408 2409 2410 2411 2412 2413 2414 2415 2416 2417 2418 2419 2420 2421 2422 2423 2424 2425 2426 2427 2428 2429 2430 2431 2432 2433 2434 2435 2436 2437 2438 2439 2440 2441 2442 2443 2444 2445 2446 2447 2448 2449 2450 2451 2452 2453 2454 2455 2456 2457 2458 2459 2460 2461 2462 2463 2464 2465 2466 2467 2468 2469 2470 2471 2472 2473 2474 2475 2476 2477 2478 2479 2480 2481 2482 2483 2484 2485 2486 2487 2488 2489 2490 2491 2492 2493 2494 2495 2496 2497 2498 2499 2500 2501 2502 2503 2504 2505 2506 2507 2508 2509 2510 2511 2512 2513 2514 2515 2516 2517 2518 2519 2520 2521 2522 2523 2524 2525 2526 2527 2528 2529 2530 2531 2532 2533 2534 2535 2536 2537 2538 2539 2540 2541 2542 2543 2544 2545 2546 2547 2548 2549 2550 2551 2552 2553 2554 2555 2556 2557 2558 2559 2560 2561 2562 2563 2564 2565 2566 2567 2568 2569 2570 2571 2572 2573 2574 2575 2576 2577 2578 2579 2580 2581 2582 2583 2584 2585 2586 2587 2588 2589 2590 2591 2592 2593 2594 2595 2596 2597 2598 2599 2600 2601 2602 2603 2604 2605 2606 2607 2608 2609 2610 2611 2612 2613 2614 2615 26

得られたパノラマ画像を説明するための図である。

【図15】内部固視標を可動の構成として得られた動画像を説明するための説明図である。

【図16】外部固視標を用いて従来のパノラマ画像を得る場合の説明図である。

【図17】画面上に静止画Er4'を表示すると共に、撮影すべき部位Er11を動画で円形枠Ci内に表示し

た状態を示す図である。

【符号の説明】

8A…画面

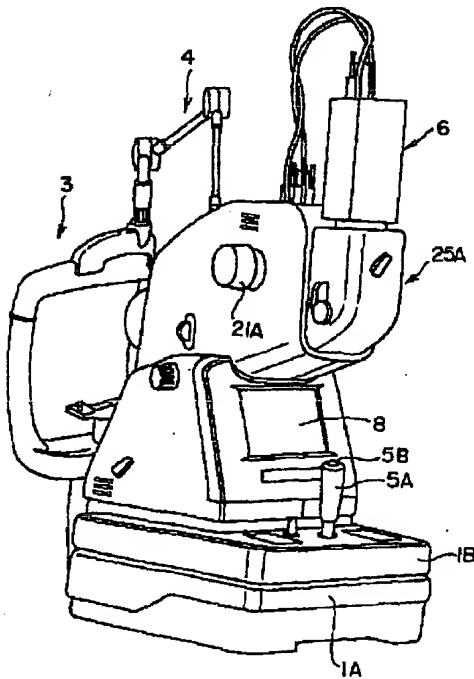
9…制御装置（表示制御手段）

60…操作手段（表示制御手段）

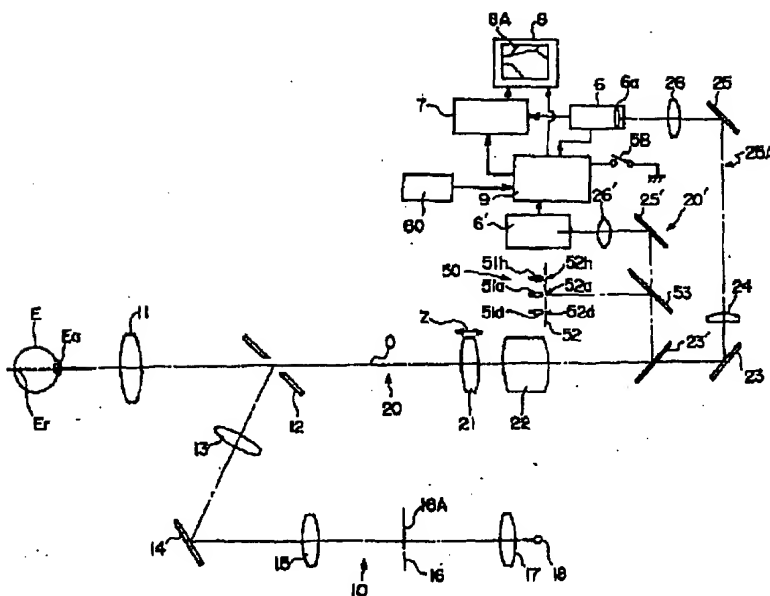
Er1～Er9…撮影すべき部位

Er1'～Er9'…静止画

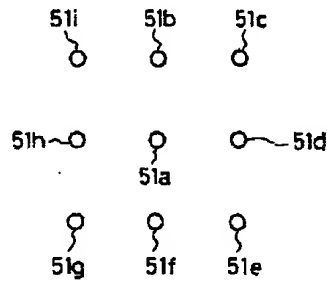
【図1】



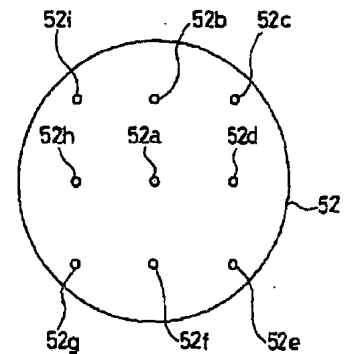
【図2】



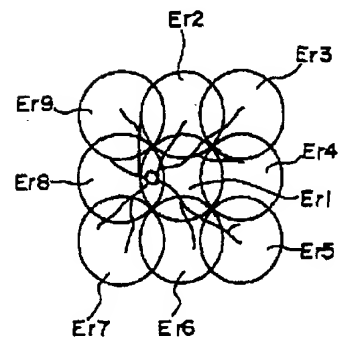
【図3】



【図4】



【図5】



PATENT ABSTRACTS OF JAPAN

(11)Publication number : **2000-189387**

(43)Date of publication of application : **11.07.2000**

(51)Int. Cl.

A61B 3/14

G02B 7/02

G03B 15/00

G03B 17/48

(21)Application number : **10-371799**

(71)Applicant : **TOPCON CORP**

(22)Date of filing : **28.12.1998**

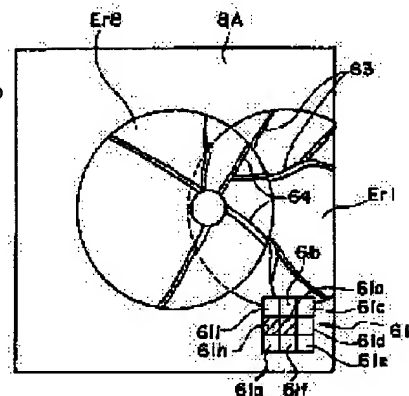
(72)Inventor : **OKASHITA TOSHIHIRO
KATO TAKEYUKI**

(54) OPHTHALMIC IMAGING DEVICE

(57)Abstract:

PROBLEM TO BE SOLVED: To produce panoramic images of regions to be imaged by photographing these regions with an observed one yet to be imaged interrelated intuitively with another or others having been imaged.

SOLUTION: The ophthalmic imaging device observes, as observation regions, partial regions to be imaged Er1 to Er8, by way of example, out of the whole region of an eye to be examined, and photographs the imaging regions Er1 to Er8, before displaying on a screen 8A a panoramic image consisting of interrelated still pictures obtained from the imaging. A display control means is provided to produce a movie display of the observation regions related to the still pictures on the screen 8A.



LEGAL STATUS

[Date of request for examination]

[Date of sending the examiner's decision of rejection]

[Kind of final disposal of application other than the examiner's decision of rejection or application converted registration]

[Date of final disposal for application]

[Patent number]

[Date of registration]

[Number of appeal against examiner's decision of rejection]

[Date of requesting appeal against examiner's decision of rejection]

[Date of extinction of right]

Copyright (C); 1998,2000 Japan Patent Office

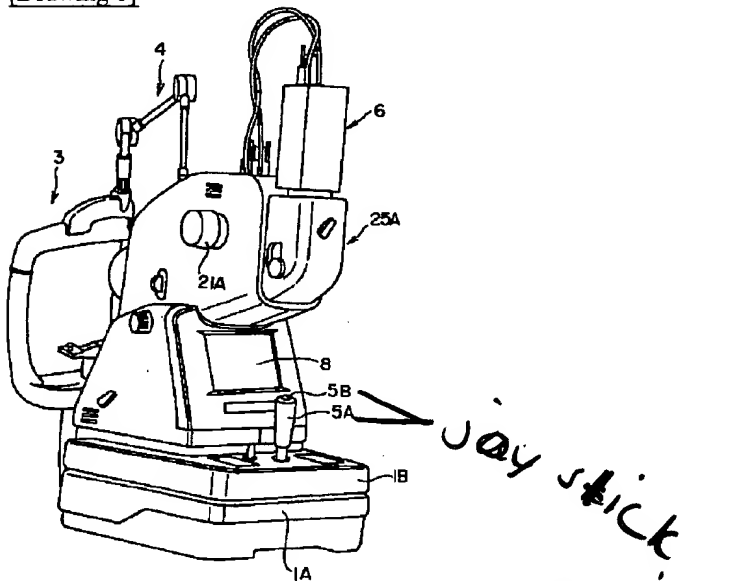
* NOTICES *

Japan Patent Office is not responsible for any damages caused by the use of this translation.

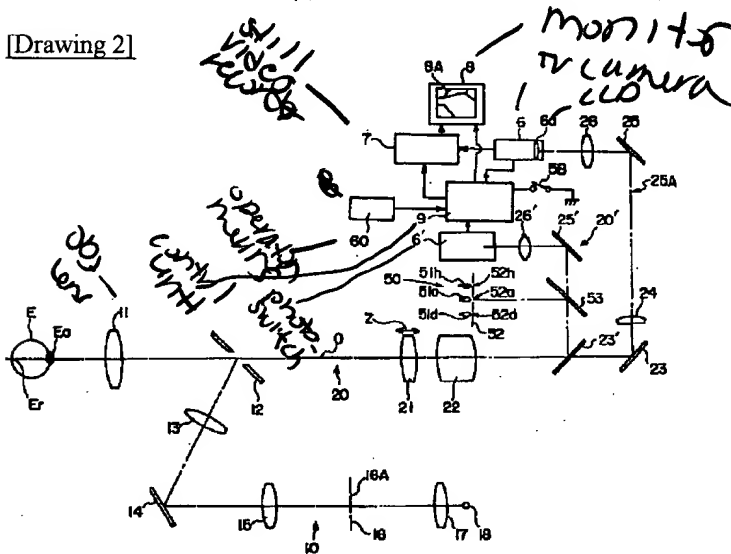
1. This document has been translated by computer. So the translation may not reflect the original precisely.
2. **** shows the word which can not be translated.
3. In the drawings, any words are not translated.

DRAWINGS

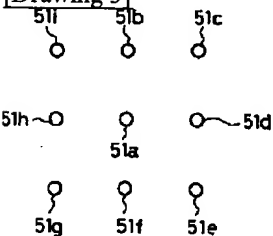
[Drawing 1]



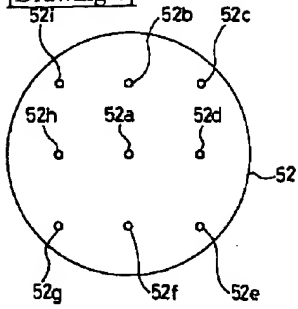
[Drawing 2]



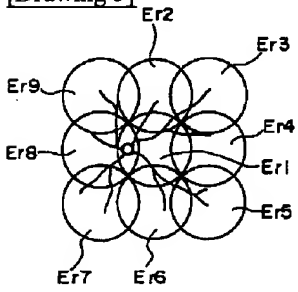
[Drawing 3]



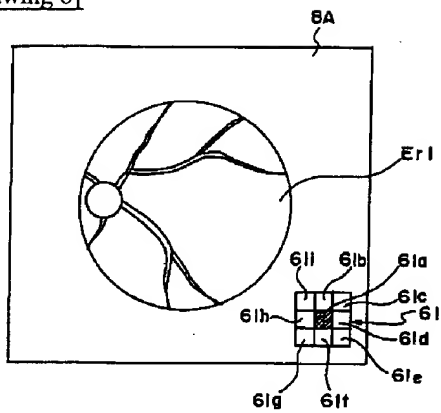
[Drawing 4]



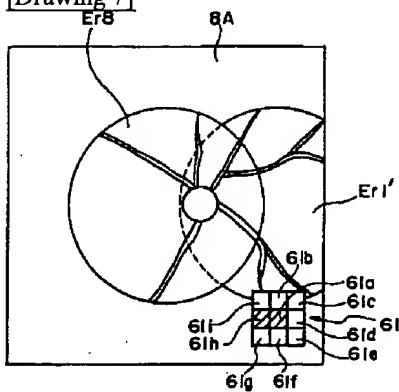
[Drawing 5]



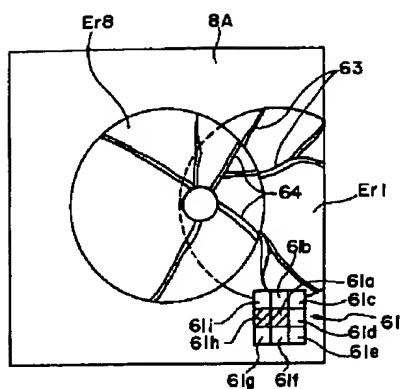
[Drawing 6]



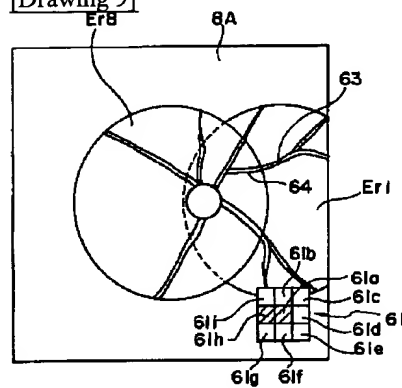
[Drawing 7]



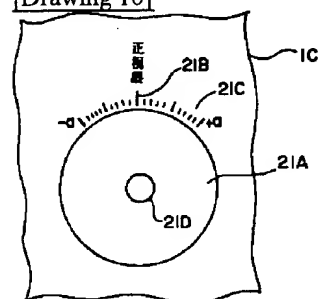
[Drawing 8]



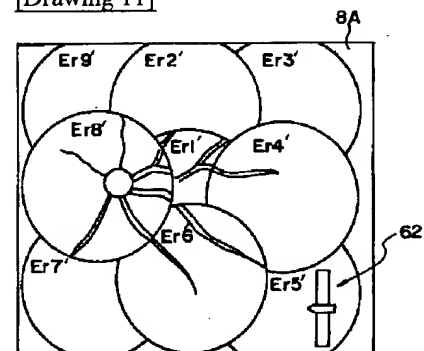
[Drawing 9]



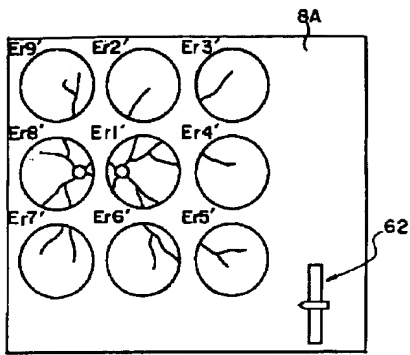
[Drawing 10]



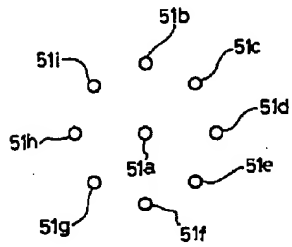
[Drawing 11]



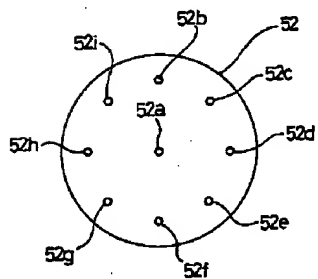
[Drawing 12]



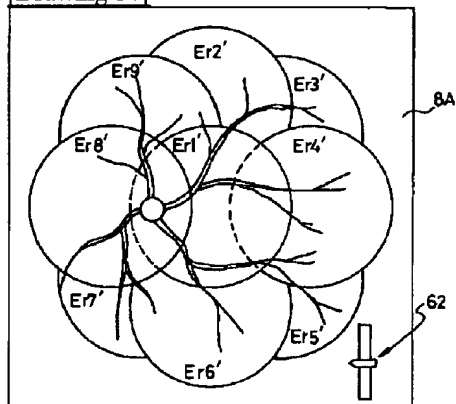
[Drawing 13]
(a)



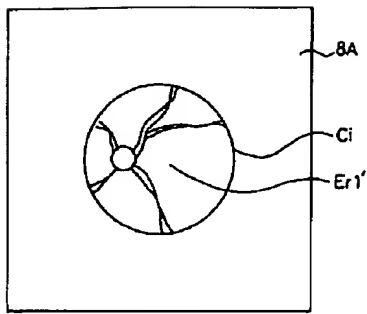
(b)



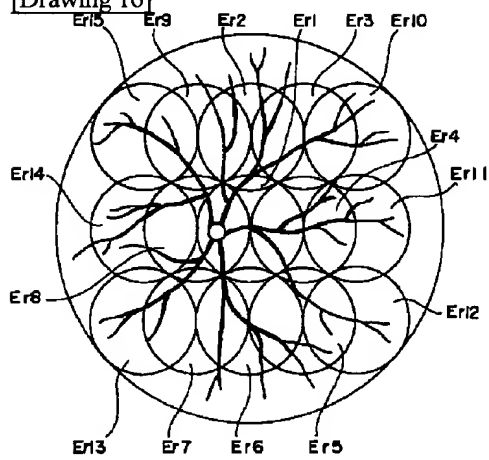
[Drawing 14]



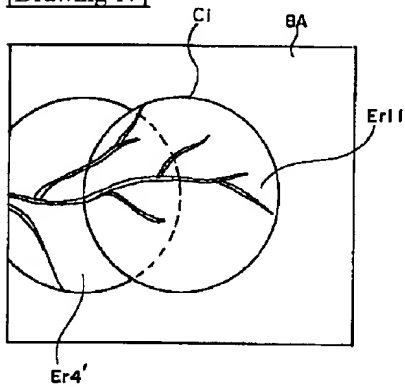
[Drawing 15]



[Drawing 16]



[Drawing 17]



[Translation done.]

* NOTICES *

Japan Patent Office is not responsible for any damages caused by the use of this translation.

1. This document has been translated by computer. So the translation may not reflect the original precisely.
2. **** shows the word which can not be translated.
3. In the drawings, any words are not translated.

DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]

[Drawing 1] It is the external view of the ophthalmology photography equipment concerning this invention.

[Drawing 2] It is the optical view of the ophthalmology photography equipment concerning this invention.

[Drawing 3] It is drawing showing the array state of light emitting diode shown in drawing 2.

[Drawing 4] It is the plan of the mask board shown in drawing 2.

[Drawing 5] It is drawing showing the partition of the eyegrounds part which should be photoed.

[Drawing 6] It is drawing for explaining the state where the part Er1 which should be photoed is displayed on the screen by the animation.

[Drawing 7] It is drawing for explaining the state where the part Er8 which should be photoed while the part [finishing / photography] Er1 is displayed by still picture Er1' is displayed by the animation.

[Drawing 8] When the diopter examined the eyes has shifted from the emmetropia, in order that a photography scale factor may change, it is drawing for explaining that still picture Er1' displayed on the screen and the part Er8 which should be photoed shift.

[Drawing 9] It is drawing showing the state where the vessel of still picture Er1' which rectifies a display scale factor and is shown in drawing 8, and the vessel of the part Er8 which should be photoed were connected correctly.

[Drawing 10] They are the elements on larger scale for explaining the detail of the focus handle shown in drawing 1.

[Drawing 11] It is drawing showing the state where connected each still picture and it displayed as a panorama picture on the screen.

[Drawing 12] It is drawing showing the state where reduced each still picture and it displayed in parallel on the screen.

[Drawing 13] It is drawing for explaining a modification with the mask board shown in the light emitting diode shown in drawing 3, and drawing 4, and (a) shows the modification of the array of light emitting diode, and (b) shows the modification of the array of a pinhole.

[Drawing 14] It is drawing for explaining the panorama picture acquired using the array of the light emitting diode shown in drawing 13.

[Drawing 15] It is explanatory drawing for explaining the dynamic image obtained considering the internal fixation label as movable composition.

[Drawing 16] It is explanatory drawing in the case of acquiring the conventional panorama picture using an external fixation label.

[Drawing 17] While displaying still picture Er4' on a screen, it is drawing showing the state where the part Er1 l which should be photoed was displayed in the circular frame Ci by the animation.

[Description of Notations]

8A -- Screen

9 -- Control unit (display-control means)

60 -- Operation means (display-control means)

Er1-Er9 -- Part which should be photoed

Er1'-Er9' -- Still picture

[Translation done.]

* NOTICES *

Japan Patent Office is not responsible for any damages caused by the use of this translation.

1. This document has been translated by computer. So the translation may not reflect the original precisely.
2. **** shows the word which can not be translated.
3. In the drawings, any words are not translated.

DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[The technical field to which invention belongs] this invention relates to improvement of the ophthalmology photography equipment which photos photography parts, such as eyegrounds examined the eyes, endothelium camerae anterioris, and a cornea cross section.

[0002]

[Description of the Prior Art] From the former, the ophthalmology photography equipment which photos photography parts, such as eyegrounds examined the eyes, endothelium camerae anterioris, and a cornea cross section, is known. With this kind of ophthalmology photography equipment, for example, the fundus camera which photos eyegrounds A photograph is taken, respectively, observing each observation part which expressed as the animation on the screen of a monitor by having made into the observation part (alignment picture) each part grade which should be photoed as the whole eyegrounds portion, and was displayed on this screen. It records on a still video recorder etc. by using as a still picture each part grade which was obtained by this photography and which should be photoed, each still picture obtained by this photography is associated mutually, and it is made to display on a screen as a panorama picture.

[0003]

[Problem(s) to be Solved by the Invention] However, each still picture obtained when each fundus-of-the-eye part should be associated and it should express as this kind of ophthalmology photography equipment as a still picture on the screen of a monitor is associated, the work which sticks and is compounded is troublesome, and there is also a possibility of making a mistake in and associating each still picture, and it has been a problem when inspecting the whole eye examination-ed in the large range.

[0004] Then, while establishing a position selection means to choose as JP,9-173298,A the part which should take [examined the eyes] a photograph by the thing of an indication and recording the part which should be photoed on a record means as a still picture by photography, the photography position chosen by the position selection means is recorded on a record means, and picture control means associate each still picture based on a photography position, and it is made to make it display on a screen.

[0005] There is also no possibility of making a mistake in and associating each still picture without troubling to the work which associates each obtained still picture, sticks and is compounded according to this thing.

[0006] however, by the thing of an indication, to this JP,9-173298,A Since it is [that the photography part which photography has already finished is not displayed on a screen, but the part which it is going to photo from now on and which should be photoed is only displayed by the animation on a screen, and] while observing the eye examination-ed While observing the part which it is going to photo from now on and which should be photoed, there is a problem of being hard to grasp an interrelation with the photography part which photography has already finished intuitively.

[0007] The place which succeeded in this invention in view of the above-mentioned situation, and is made into the purpose is to offer the ophthalmology photography equipment which can take a photograph, grasping intuitively an interrelation with the photography part which photography has already finished while observing the part which it is going to photo from now on, and which should be photoed, and can acquire a panorama picture.

[0008]

[Means for Solving the Problem] After the ophthalmology photography equipment of this invention according to claim 1 observes the part which should be photoed as the whole eye examination-ed portion as an observation part, It is ophthalmology photography equipment which associates mutually the still picture which photoed the aforementioned part which should carry out photography and was obtained by this photography, and is displayed on a screen as a panorama picture. It is characterized by establishing a display-control means to control so that it relates with the aforementioned still picture and the aforementioned observation part is displayed on the aforementioned screen by the animation.

[0009] The ophthalmology photography equipment of this invention according to claim 2 is characterized by controlling the aforementioned display-control means so that the still picture which the aforementioned observation part is displayed on a part for the center section on the aforementioned screen, and is related with the aforementioned observation part is displayed on the periphery on the aforementioned screen.

[0010] The ophthalmology photography equipment of this invention according to claim 3 is characterized by preparing the display scale factor on the aforementioned screen in the amendment display scale-factor amendment means based on the diopter examined [aforementioned] the eyes.

[0011] The ophthalmology photography equipment of this invention to which the aforementioned part to which photography should be carried out is characterized by the ophthalmology photography equipment of this invention according to claim 4 being a fundus-of-the-eye part according to claim 5 After observing the part which should be photoed as the whole eye examination-ed portion as an observation part, It is ophthalmology photography equipment which associates mutually the still picture which photoed the aforementioned part which should carry out photography and was obtained by this photography, and is displayed on a screen as a panorama picture. It is characterized by having a specification means to specify on a screen either of each still picture displayed on the aforementioned screen by relating mutually, and a brilliance-control means to adjust the brightness on the screen of the still picture specified by this specification means.

[0012]

[Embodiments of the Invention] the external view of the non-**** type fundus camera as an example of the ophthalmology photography equipment concerning this invention in drawing 1 -- being shown -- this drawing 1 -- setting -- 1A -- the base and 1B -- a stand and 1C -- for frame reliance and 4, external ***** and 5A of a joy stick and 5B are [the main part of equipment, and 2 / a jaw receptacle and 3 / a photography switch and 6] TV cameras, and these composition is well-known

[0013] The interior of the main part of equipment is equipped with the lighting optical system 10 for illuminating the fundus of the eye Er examined [E] the eyes, as shown in drawing 2, the photography optical system 20 which photos the fundus of the eye Er, observation optical-system 20', the internal ***** projection optical system 50 for projecting ***** on the fundus of the eye Er, and making an eye examination-ed *****, and the alignment optical system (illustration is omitted) for performing alignment of the main part of equipment to an eye examination-ed.

[0014] the lighting optical system 10 -- an objective lens 11 and a hole -- it has the empty mirror 12, a relay lens 13, the reflective mirror 14, a relay lens 15, the pupil Ea examined [E] the eyes and the ring opening board 16 which has ring opening 16A maintained at the conjugate relation, a condensing lens 17, and the lighting light source 18

[0015] The lighting optical system 10 illuminates the fundus of the eye by infrared light at the time of observation, illuminates the fundus of the eye by the light at the time of photography, and since the composition is well-known, it omits the detailed explanation.

[0016] The photography optical system 20 has an objective lens 11, a focussing lens 21, the image formation lens 22, and the reflective mirror 23, and TV camera 6 has image pck-up element 6a. TV camera 6 is optically connected to the photography optical system 20 through relay lens system 25A which consists of the field lens 24, a reflective mirror 25, and a relay lens 26. The image pck-up element 6a is optically maintained by the conjugate relation with the fundus of the eye Er.

[0017] observation -- optical system -- 20 -- ' -- a dichroic mirror -- 23 -- ' -- reflection -- a mirror -- 25 -- ' -- a relay lens -- 26 -- ' -- a TV camera -- six -- ' -- having . Dichroic mirror 23' reflects infrared light, and has the property which penetrates the light.

[0018] TV camera 6 is connected to the still video recorder 7 as an image recording equipment machine, and this still video recorder 7 is connected to the monitor 8. When photoing the fundus of the eye examined the eyes to the screen 8A, the part which should be photoed as the whole fundus of the eye portion is expressed on the monitor 8 as an animation as an observation part.

[0019] A ** person takes a photograph by performing alignment, observing the observation part. The part which should be photoed is recorded on the still video recorder 7 as a still picture. The still picture recorded on the still video recorder 7 is displayed on screen 8A. The monitor 8 and the still video recorder 7 are controlled by the control unit 9, and mention the detail of the control later.

[0020] Eight light emitting diodes 51b-51i arranged in the shape of a square at equal intervals around light emitting diode 51a arranged at the center, and this light emitting diode 51a as the internal ***** projection optical system 50 is shown in drawing 3 , It consists of the mask board 52 which has the pinholes 52a-52i countered and prepared in each light emitting diodes 51a-51i as shown in drawing 4 , a one-way mirror 53, the image formation lens 22, a focussing lens 21, and an objective lens 11.

[0021] The light of these light emitting diodes 51a-51i Pinholes 52a-52i, It is projected on the fundus of the eye Er as ***** through a one-way mirror 53, the image formation lens 22, a focussing lens 21, and an objective lens 11. By any of these pinholes 52a-52i a **-ed person makes turn [carry out / image formation of the pinhole image / to the fundus of the eye Er] on by fixing **** by checking this ***** by looking The direction of a **-ed person's **** to the optical axis O of the photography optical system 20 is switched, and the part which should photo the fundus of the eye Er by this is changed. Here, the part which should photo the fundus of the eye Er could be nine pieces as shown in drawing 5 .

[0022] If the part Er1 which should photo a center if light emitting diode 51a is made to turn on is photoed and light emitting diode 51b is made to turn on If the part Er2 which should photo right above is photoed and light emitting diode 51c is made to turn on If the part Er3 which should photo the diagonal right is photoed and 51d of light emitting diodes is made to turn on If the part Er4 which should photo the right is photoed and light emitting diode 51e is made to turn on If the part Er5 which should photo the diagonal below is photoed and 51f of light emitting diodes is made to turn on If the part Er6 which should photo right under is photoed and 51g of light emitting diodes is made to turn on If the part Er8 which should photo the left if the part Er7 which should photo the diagonal below is photoed and 51h of light emitting diodes is made to turn on is photoed and light emitting diode 51i is made to turn on, the part Er9 which should photo the diagonal left will be photoed.

[0023] As shown in drawing 6 , before photography, the part which should be photoed as the whole fundus of the eye Er portion is displayed on a monitor's 8 screen 8A as an alignment picture. This alignment picture is an animation. At this drawing 6 , the part Er1 which should be photoed in the abbreviation center section is displayed on screen 8A by the animation as that to which the eye examination-ed is ****(ing) light emitting diode 51a.

[0024] A control unit 9 has the operation meanses 60, such as a mouse, and the recognition pattern 61 which makes the position

of the whole fundus of the eye Er part which should be photoed recognize with an alignment picture and a static image is displayed on screen 8A by operating the operation means 60. Since a photograph has not been taken about the fundus-of-the-eye parts Er2-Er9, in drawing 6, only the part Er1 which should be photoed is displayed and the still picture mentioned later is not displayed.

[0025] The recognition pattern 61 consists of nine grids 61a-61i here, and this nine grid 61a or 61i is arranged with the physical relationship corresponding to the photography parts Er1-Er9, respectively. If photography of the part which should be photoed, for example is performed, the brightness of the grid corresponding to the part which should be photoed this recognition pattern 61 in the state where make it become high and photography is not performed at all. If the brightness of each grids 61a-61i is low brightness, for example, photography is performed by operating photography switch 5B in the state where the alignment picture of the central part Er1 is displayed. Grid 61a is changed into high brightness from low brightness, and it is recognized whether photography of the part which should photo which position of the whole fundus of the eye Er part which should be photoed was performed by this. The part Er1 which should be photoed is recorded on the still video recorder 7 as still picture Er1'. Next, if 51h of light emitting diodes is made to turn on and **** examined [E] the eyes is guided, the alignment picture corresponding to the part Er8 which should be photoed to screen 8A as shown in drawing 7 will be expressed as an animation. The part Er8 which should be photoed is displayed on the abbreviation center section of screen 8A.

[0026] If the operation means 60 is operated and call specification of a desired still picture (here Er1') is carried out on screen 8A, while still picture Er1' will be displayed, the recognition pattern 61 is displayed. If this operation means 60 is operated and observation is specified on screen 8A, still picture Er1' will maintain a relative-position relation to the alignment picture Er, and will be moved to the periphery on screen 8A. It functions as a display-control means to control so that a part of still picture Er1' is displayed on screen 8A, a control unit 9 and the operation means 60 are related with a still picture on screen 8A and an observation part is displayed by the animation.

[0027] A photograph can be taken grasping intuitively an interrelation with the photography part which photography has already finished, while this is observing the part which it is going to photo from now on and which should be photoed, and a panorama picture can be acquired. Moreover, without reducing an observation part, it can display on a screen and a still picture and an observation part can be associated.

[0028] It is displayed on screen 8A that 61h of grids was changed into high brightness from low brightness, and the photography part of the fundus-of-the-eye photography part Er8 was performed in this state when photography was performed by operating photography switch 5B. In the drawing 7, a slash shows the grids 61a and 61h which photography was performed and became high brightness. Simultaneously, the fundus-of-the-eye photography part Er8 is recorded on the still video recorder 7. In case a control unit 9 records each photography parts Er1-Er9 on the still video recorder 7, it makes photography part information record with each photography parts Er1-Er9. Here, the same signs Er1-Er9 are used as photography part information.

[0029] By the way, it considers that the diopter examined the eyes is 0 times (normal), and the relative-position relation of the parts Er1-Er9 which should be each photoed is calculated, and it is made to express to screen 8A as this ophthalmology photography equipment. However, since photography scale factors differ when it is [examined / myopia and / longsighted / the eyes] when the diopter examined the eyes is not 0 times namely, as shown in drawing 8, there is a trouble that the animation which adjoins a still picture [finishing / photography] and this cannot be connected with a sufficient precision.

[0030] the diopter value when focusing by moving the focussing lens 21 shown in drawing 2 using focus handle 21A shown in drawing 1 in the direction of an optical axis, since the fixed relation between the diopter examined the eyes and a photography scale factor was -- being based -- the display scale factor on screen 8A -- a control unit 9 -- an amendment -- if it is made like, the animation which adjoins a still picture [finishing / photography / as shown in drawing 9], and this can be connected with a sufficient precision. Graduation 21C of reference-mark 21B of a stigmatism eye position, +a (diopter), and -a (diopter) is prepared, as shown in drawing 10, if focus button 21D is pushed when a focussing lens 21 is moved and it focuses by operating focus handle 21A, the diopter examined the eyes will be memorized by the control unit 9, and, thereby, a change of a display scale factor will be made to the circumference of focus handle 21A. At this time, a control unit 9 functions based on the diopter value examined the eyes considering a display scale factor as an amendment display scale-factor amendment means.

[0031] If it finishes photoing the each parts Er1-Er9 which should be photoed and the operation means 60 is operated, as shown in drawing 11, a fundus-of-the-eye image will be displayed on screen 8A by still picture Er1' - Er9' as an overview (panorama picture). Here, the brightness of each still picture Er1' - Er9' is seen and measured, and suppose that there was a still picture with very high brightness or a low still picture.

[0032] In this case, a still picture with the high brightness or a low still picture is clicked and specified on the picture in which cursor is moved by the operation means 60, such as a mouse, and cursor is located. Then, the brilliance-control virtual slide knob 62 is displayed on screen 8A at the same time the specified still picture appears in the front face of screen 8A.

[0033] It can consider as the brightness of the still picture which operates the brilliance-control virtual slide knob 62 on a screen by the operation means 60, and adjoins each other, and brightness without sense of incongruity, each still picture is continuously connected without sense of incongruity, and the whole image examined the eyes can be compounded.

[0034] Moreover, each still picture Er1' - Er9' may be displayed on drawing 12 in parallel, the luminosity of each still picture Er1' - Er9' may be seen and compared, brilliance-control specification may be performed to every each still picture Er1' - Er9', and the brilliance control for every still picture may be performed.

[0035] Since light emitting diodes 51b-51i as ***** were considered as the square-like array the center [light emitting diode 51a], although there is the advantage in which the lap portion of the still picture (fundus-of-the-eye image) of an adjoining

fundus-of-the-eye part shown in drawing 11 can be lessened, with the form of implementation of this invention As shown in drawing 13 (a), while arranging light emitting diodes 51b-51i on a periphery focusing on light emitting diode 51a As shown in drawing 13 (b), the pinholes 52a-52i of the mask board 52 are made to correspond to light emitting diodes 51a-51i, and it arranges, and you may make it display still picture Er1' - Er9' on screen 8A, as shown in drawing 14 .

[0036] Although it enables it to photo the fundus-of-the-eye image within the limits of 80 degrees centering on the center of the fundus of the eye, you may enable it to photo the fundus-of-the-eye image within the limits of 100 degrees and 120 degrees here.

[0037] Moreover, arbitrarily, using movable ***** which can be repositioned as internal *****, as shown in drawing 15 While changing the fundus-of-the-eye part which should be photoed by displaying the circular frame Ci in the center of screen 8A before photography, displaying as an animation the fundus-of-the-eye part which should be photoed in this screen 8A, and following movable ***** on carrying out a variation rate from a criteria position You may make it change the position of the circular frame on screen 8A from a mid gear according to the amount of displacement from the criteria position of movable *****.

[0038] Although the form of implementation of the above invention explained the case where a panoramic exposure was performed using internal *****, you may be made to take a photograph using external *****.

[0039] The range which should be photoed when taking a photograph using external ***** is wide range, and the ** person is taking a photograph by [as adjoining photography images' overlapping considerably], as it depends on experience and intuition so that it may photograph and there may be no remnants part, and shown in drawing 16 . The state where the pictures which adjoin the drawing 16 mutually [the still picture of 15 sheets of signs Er1-Er15] overlapped in most portion is shown.

[0040] Therefore, when the panoramic exposure of a fundus-of-the-eye image was conventionally performed using external *****, photography number of sheets increased and there was a problem of wasting a film. Then, as shown in drawing 17 , while changing the animation as a fundus-of-the-eye part which displays the circular frame Ci on a part for the center section of screen 8A, and is displayed on screen 8A with guidance examined the eyes according to external ***** within the circular frame Ci It is made to correspond to the amount of displacement from the criteria position of external *****, and you may make it move relatively the still picture [finishing / photography] to the circular frame Ci on screen 8A. Here, still picture Er4' is displayed on screen 8A as a still picture [finishing / photography].

[0041] A panorama picture can be acquired lessening the lap of the fundus-of-the-eye image which adjoins, grasping correctly the physical relationship over the still picture of the animation in the circular frame Ci which it is going to photo from now on, seeing the fundus-of-the-eye image as a still picture of screen 8A according to this thing as much as possible.

[0042]

[Effect of the Invention] The effect that a photograph can be taken grasping intuitively an interrelation with the photography part which photography has already finished while observing the part which it is going to photo from now on and which should be photoed according to the ophthalmology photography equipment of this invention according to claim 1, and a panorama picture can be acquired is done so.

[0043] Since according to the ophthalmology photography equipment of this invention according to claim 2 it displays on the center section of the screen by making an observation part into an animation and the still picture displayed the part on the periphery of a screen, without reducing most observation parts, it can display on a screen and a still picture and an observation part can be associated.

[0044] According to ophthalmology photography equipment given in the claims 3 and 4 of this invention, the change of a photography scale factor based on the diopter examined the eyes can be rectified, each adjacent still picture can be connected with a more sufficient precision, and by making especially a fundus-of-the-eye image into a panorama picture, on a screen, the blood vessel of each fundus-of-the-eye part is connected correctly, and can be displayed.

[0045] A specification means to specify on a screen either of each still picture displayed on the screen by relating mutually according to the ophthalmology photography equipment of this invention according to claim 5, Since it has a brilliance-control means to adjust the brightness on the screen of the still picture specified by this specification means, even when the brightness of each still picture displayed on the screen differs, the effect that each still picture is continuously connected without sense of incongruity, and the whole image examined the eyes can be compounded is done so.

[Translation done.]

*** NOTICES ***

Japan Patent Office is not responsible for any damages caused by the use of this translation.

1. This document has been translated by computer. So the translation may not reflect the original precisely.
2. **** shows the word which can not be translated.
3. In the drawings, any words are not translated.

CLAIMS

[Claim(s)]

[Claim 1] After observing the part which should be photoed as the whole eye examination-ed portion as an observation part, It is ophthalmology photography equipment which associates mutually the still picture which photoed the aforementioned part which should carry out photography and was obtained by this photography, and is displayed on a screen as a panorama picture.

Ophthalmology photography equipment characterized by establishing a display-control means to control so that it relates with the aforementioned still picture and the aforementioned observation part is displayed on the aforementioned screen by the animation.

[Claim 2] The aforementioned display-control means is ophthalmology photography equipment according to claim 1 characterized by controlling so that the still picture which the aforementioned observation part is displayed on a part for the center section on the aforementioned screen, and is related with the aforementioned observation part is displayed on the periphery on the aforementioned screen.

[Claim 3] Ophthalmology photography equipment according to claim 1 with which the display scale factor on the aforementioned screen is prepared in the amendment display scale-factor amendment means based on the diopter examined [aforementioned] the eyes.

[Claim 4] Ophthalmology photography equipment according to claim 3 characterized by the aforementioned part which should carry out photography being a fundus-of-the-eye part.

[Claim 5] Ophthalmology photography equipment which associates mutually the still picture which photoed the aforementioned part which should carry out photography and was obtained by this photography after observing the part which should be photoed as the whole eye examination-ed portion characterized by providing the following as an observation part, and is displayed on a screen as a panorama picture. A specification means to specify on a screen either of each still picture displayed on the aforementioned screen by relating mutually. A brilliance-control means to adjust the brightness on the screen of the still picture specified by this specification means.

[Translation done.]

